

Summary of Big Bend National Park GRI meeting January 15-17, 2002

SUMMARY

A Geologic Resources Inventory (GRI) workshop was held for Big Bend National Park (BIBE) on January 15-17th, 2002. The purpose was to view and discuss the park's geologic resources, to address the status of geologic mapping for compiling both paper and digital maps, and to assess resource management issues and needs. Cooperators from the NPS Geologic Resources Division (GRD), Guadalupe Mountains National Park, Redwoods National Park, BIBE, Texas Bureau of Economic Geology, National Resource and Conservation Service, various academic institutions (Sul Ross State University, Texas Tech, and University of Texas PB), and the United States Geologic Survey (USGS) were present for the workshop.

The workshop involved field trips to various points of interest in BIBE, led by both various USGS, academic and BIBE staff, as well as another full-day scoping session to present overviews of the NPS Inventory and Monitoring (I&M) program, the GRD, and the on-going GRI. Round table discussions involving geologic issues for BIBE included the status of geologic mapping efforts, interpretation, sources of available data, and action items generated from this meeting.

Additionally, a "GeoIndicators" scoping session was tied on to this GRI scoping on the last day. This is part of the NPS GPRA goal Ib4: Identifying Human Influences to Geologic Processes. This portion of the meeting is summarized in a different report available from Vicki Ozaki.

For a list of meeting attendees, see **Appendix A (List of Cooperators for Big Bend NP GRI Workshop, January 15-17, 2002)**.

OVERVIEW OF GEOLOGIC RESOURCES INVENTORY (GRI)

The NPS GRI has the following goals for some 273 units with significant natural resources:

- 1) To assemble a bibliography ("**GRBIB**") of known geological publications to compile and evaluate a list of existing geologic maps for each unit,
- 2) To conduct a scoping session for each park,
- 3) To develop digital geologic map products for use in a GIS (geographic information system), and
- 4) To complete a geologic report that synthesizes much of the existing geologic knowledge about each park.

It is stressed that the emphasis of the inventory is not to routinely initiate new geologic mapping projects, but to aggregate existing "baseline" information and identify where serious geologic data needs and issues exist in the National Park System. In cases where map coverage is nearly complete (ex. 4 of 5 quadrangles for Park "X") or maps simply do not exist, then funding may be available for geologic mapping.

After introductions by the participants, Bruce Heise (NPS-GRD) presented overviews of the Geologic Resources Division, the NPS I&M Program, the status of the Natural Resource Inventories, and the Geologic Resource Inventory in particular.

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Tim Connors (NPS-NRID) presented a demonstration of some of the main features of the digital geologic database for the Black Canyon of the Gunnison NP and Curecanti NRA in Colorado. This has become the prototype for the NPS digital geologic map model as it reproduces all aspects of a paper map (i.e. it incorporates the map notes, cross sections, legend etc.) with the added benefit of being geospatially referenced. It is displayed in ESRI ArcView shape files and features a built-in Microsoft Windows help file system to identify the map units. It can also display scanned JPG or GIF images of the geologic cross sections supplied with the paper "analog" map. Geologic cross section lines (ex. A-A') are subsequently digitized as a line coverage and are hyperlinks to the scanned images.

GRBIB

At the scoping session, individual Microsoft Word Documents of Geologic Bibliographies for BIBE were distributed.

The sources for this compiled information are as follows:

- AGI (American Geological Institute) GeoRef
- USGS GeoIndex
- ProCite information taken from specific NPS park libraries

These bibliographic compilations were validated by GRI staff to eliminate duplicate citations, typographical errors, and as well as to check for applicability to the specific park. After validation, they become part of a Microsoft Access database parsed into columns bases on park, author, year of publication, title, publisher, publication number, and a miscellaneous column for notes.

For the Access database, they are exported as Microsoft Word Documents for easier readability, and eventually turned into PDF documents. They are then posted to the GRI website at: <http://www2.nature.nps.gov/grd/geology/gri/products/geobib/> for general viewing.

EXISTING GEOLOGIC MAPS

In 1966, Ross Maxwell published his "Geologic Map of Big Bend National Park, Brewster County, Texas at 1:62,500 scale. In 1968, he published a larger work, "The Big Bend of the Rio Grande: A Guide to the Rocks, Landscape, Geologic History, and Settlers of the Area of Big Bend National Park"; this was published by the Texas Bureau of Economic Geology, Guidebook 7. These two publications remain the pre-eminent synthesis for the geology of BIBE.

Although not in the national park, there is also a published geologic map of "Big Bend Ranch State Park, Texas" produced by the Texas Bureau of Economic Geology in 2002. This work may be useful in trying to edge-match map unit descriptions for any new mapping in BIBE. It also contains useful write-ups on the local geology

However, because various geologic interpretations and theories have changed over the years, the map is in some need of updating (even Ross Maxwell conceded this while he was still alive!). Thus, the USGS, the state, and various academics are very interested

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in partaking of a project to produce a more refined map (likely at 1:100,000 scale) of the Big Bend area.

Betty Alex (BIBE-GIS Specialist) had the Maxwell map digitized in Santa Fe but they didn't capture all of the attributes, and there are problems when one tries to rectify the image. Also, the original map was not done on a topographic base and that is desperately needed.

See **Appendix B** (*BIBE Quadrangles of Interest and available digital geology*).

ADDITIONAL NEEDED GEOLOGIC MAPPING / RESEARCH

Some other aspects to consider for re-mapping the park in whole are as follows:

- More detailed mapping is needed everywhere there are volcanics and exposures of the Tornillo Group, and better age control on these units is needed
- Need chemical data for all igneous rocks. Dan Barker (University of Texas) has a database of some 1200 samples for individual rock analyses that should be utilized. Maxwell apparently did not differentiate the volcanic rocks very thoroughly when he mapped.
- More detailed differentiation of surficial units is desired

When one looks at the image in Appendix B, it is obviously apparent that a portion of the park along the central-northernmost part is not included in Maxwell's map

During the scoping session a few other notable items pertaining to geology were discussed:

- There needs to be a "central" coordinator to oversee the compilation of a new mapping project. This person/agency will need to work with the involved federal-, state-, and academic institutions that have done so much work in the area over the years. At the present time, there is not a single entity taking the lead on this, so this issue still needs to be worked out. Pat Shanks (USGS) had suggested Bob Scott (USGS) be the main lead in this endeavor, but nothing was decided at the meeting in January 2002.
- Betty Alex has found a connection between an endangered cactus habitat and underlying geology that serves as an excellent "cross" natural resource issue.
- It was suggested to consult with the Mexican government regarding a new mapping project as they might be interested in such a thing as well. Also, oil companies might be interested in contributing funding to the new mapping, much like Gulf Oil did to support Maxwell's earlier efforts
- It was suggested that aeromagnetic data be used to support any new mapping and the USGS is interested because it could shed light on the complicated geologic structures that may have ties to potential gas, oil, and water issues in the region. According to Bruce Heise, at the time of the writing of this report, the USGS has begun its initiative to do fly-overs to gather aeromagnetic data. The project is being

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headed up by Vic Labsen. Apparently, the USGS international geology group had over \$200k left in their FY-2002 budget and wanted to spend it, so they moved it into the USGS Geologic Division around the third week in September. GD then needed a place to spend it, and one option they had was to move it to the contractor currently acquiring aeromagnetic data elsewhere along the border. Because this sort of data had been identified at our January meeting as critical to a new geologic map, they went ahead and dedicated about \$120k to the BIBE mapping project. It is a worthwhile plan, exactly like they did at Yellowstone where they were able to make significant strides interpreting the subsurface geology. In fact, it is the same contractor and the proposed program is identical to the one at YELL.

- BIBE staff had developed an NPS Project Management Information Statement (PMIS) regarding developing a 100,000 scale map a few years ago, but nothing ever came of the proposal. The project number is 61371A, titled a "Modern Digital Geologic Map of Big Bend National Park" with a proposed cost of \$449,995.00 in FY-2001 / 2000, by the USGS Geologic Division under Projects Linked to Parks As Classrooms
- Paleontology is a major part of natural resources at BIBE. Vince Santucci, Tony Fiorillo, Don Corrick, and others have been working on developing an intensive Paleontological survey of all known literature, specimens and locations related to BIBE. They held a preliminary scoping session in late 2000 to set the framework for this. Below are some notes from that meeting:

GEOLOGIC REPORTS

"The Big Bend of the Rio Grande: A guide to the rocks, landscape, geologic history, and settlers of the area of Big Bend National Park" by Ross A. Maxwell; published by the Bureau of Economic Geology, The University of Texas at Austin, 1968. This contains Maxwell's 1966 geologic map "Geologic Map of the Big Bend National Park, Brewster County, Texas, 1:62,500 scale.

"Down to Earth at Big Bend Ranch State Park, Texas: Geologic Map and Trail-side geology" by Christopher D. Henry and Jay A. Raney, Bureau of Economic Geology, 2002; 1:80,000 scale geologic map included.

"Geology of the Big Bend area and Solitario Dome, Texas" by the West Texas Geological Society, 1986 Field Trip Guidebook. It also contains a few maps as well.

"Down to Earth at Tuff Canyon, Big Bend National Park, Texas" by Daniel S. Barker, 2000, published by the Bureau of Economic Geology.

"A Road Guide to the Geology of Big Bend National Park" by Kerri Nelson, published by the Big Bend Natural History Association in 1992.

INTERPRETATION

During the scoping session, park resource managers showed interest in using the geologic maps for various interpretive examples throughout the park

Appendix A: List of Cooperators for Big Bend NP GRI Workshop

January 15-17, 2002

LAST NAME	FIRST NAME	TYPE	AFFILIATION	TITLE	PHONE	E-MAIL	Field Trip	Scoping Session
Urbanczyk	Kevin	academic	Sul Ross State University	geologist	915-837-8110	kevinu@sulross.edu	yes	yes
Lehman	Tom	academic	Texas Tech University	geologist	806-742-3102	tom.lehman@ttu.edu	yes	yes
Erdlac	Richard	academic	UTPB	geologist	915-699-5288	rceerdlac@cleansed.net	yes	yes
Connors	Tim	federal	NPS, Geologic Resources Division	geologist	(303) 969-2093	Tim_Connors@nps.gov	yes	yes
Heise	Bruce	federal	NPS, Geologic Resources Division	geologist	(303) 969-2017	Bruce_Heise@nps.gov	yes	yes
Higgins	Bob	federal	NPS, Geologic Resources Division	geologist	(303) 969-2018	Bob_Higgins@nps.gov	yes	yes
Bell	Gorden	federal	NPS, GUMO	paleontologist	915-828-3251, ext.249	gorden_bell@nps.gov	yes	yes
Alex	Thomas	federal	NPS-BIBE	archeologist	915-477-1144	thomas_c_alex@nps.gov	yes	yes
Corrick	Don	federal	NPS-BIBE	geologist	915-477-1146	don_corrick@nps.gov	yes	yes
Davila	Vidal	federal	NPS-BIBE	natural resources	915-477-1143	vidal_davila@nps.gov	yes	yes
Deckert	Frank	federal	NPS-BIBE	superintendent	915-477-1101	frank_deckert@nps.gov	yes	yes
Skiles	Raymond	federal	NPS-BIBE	wildlife biologist	915-477-1145	raymond_skiles@nps.gov	no	yes
Vandenberg	Tom	federal	NPS-BIBE	interpreter		tom_vandenberg@nps.gov	yes	yes
Alex	Betty	federal	NPS-BIBE GIS	GIS	915-477-1146	betty_l_alex@nps.gov	yes	yes
Shaver	Dave	federal	NPS-GRD	division chief	303-969-2094	dave_shaver@nps.gov	yes	yes
Ozaki	Vicki	federal	NPS-REDW	geologist	707-825-5142	vicki_ozaki@nps.gov	yes	yes
Loomis	Lynn	federal	NRCS	soil scientist	915-729-3217	lynn.loomis@tx.usda.gov	yes	yes
Barker	Dan	federal	University of Texas	geologist	512-471-5502	danbarker@mail.utexas.edu	yes	yes
Lyttle	Peter	federal	USGS	geologist	703-648-6943	plyttle@usgs.gov	yes	yes
Morgan	Lisa	federal	USGS	geologist	303-236-8646	lmorgan@usgs.gov	no	no
Scott	Bob	federal	USGS	geologist	(303) 236-1230	rbscott@usgs.gov	yes	yes
Shanks	Pat	federal	USGS	geologist	303-236-2497	pshanks@usgs.gov	yes	yes
Shroba	Ralph	federal	USGS	geologist	303-236-1292	rshroba@usgs.gov	yes	yes
Raney	Jay	state	Texas Bureau of Economic Geology	geologist	512-471-1534	jay.raney@beg.utexas.edu	yes	yes

Appendix B: BIBE quadrangles of interest and available digital geology

